Small Business Innovation Research/Small Business Tech Transfer

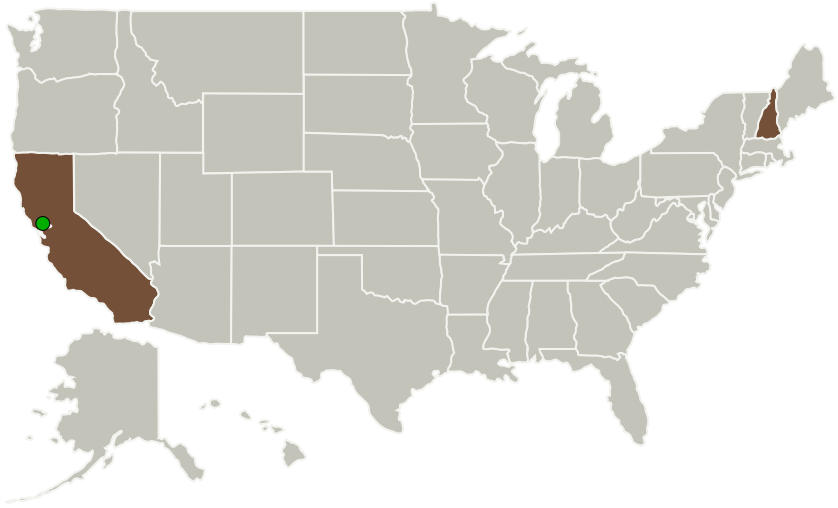
Robotic Variable Interference Filter Imaging Spectrometer (R-VIFIS), Phase I

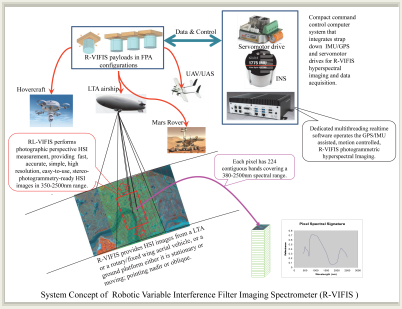
Completed Technology Project (2016 - 2016)

Project Introduction

The innovation is a fast, lightweight, and miniaturized Robotic Variable Interference Filter Imaging Spectrometer (R-VIFIS) for a 350-2500nm wavelength range. A pair of custom narrow band Linear Variable Interference Filters (LVIFs) is tailored with 350-900nm range (VNIR) and 900-2500nm range (SWIR) wedge coatings for a 35mm format CMOS Focal Plane Array (FPA) and a 384x288 pixel 24um pitch FPA respectively. A pair of monolithic LVIF-FPA devices, each having its VNIR or SWIR LVIF coating precisely aligned and mounted in contact with its FPA sensing surface, are designed and assembled. Miniaturized robotic devices are developed to precisely position the LVIF-FPAs at a fast speed. A prototype R-VIFIS integrates fast frame robotic positioning LVIF-FPAs behind a pair of co-boresighted 35mm film format lenses for fast LVIF HyperSpectral Imaging (HSI), taking 224 contiguous spectral bands into a 350-2500nm range datacube in <0.4sec, with an SNR>300 and a spectral resolution of 1% center wavelength at each band. Tightly integrated with GPS/INS with real time embedded computing, R-VIFIS collects directly georeferenced photographic perspective HSI measurement with a throughput up to 1.65GB/sec, providing simultaneously high spectral, spatial, radiometric, and temporal resolutions. A typical R-VIFIS photographic perspective datacube, consisting of well fused 6480x5400 pixel VNIR bands and 1580 x1300 pixel SWIR bands. R-VIFIS is versatile and easily-deployable. It is operational on a tripod, surface vehicles, aerostats, and fixed/rotating wing aerial platforms for field/aerial 3D imaging spectroscopy. It is also well suited to be gimbaled for wide angular field of view and long distance enhanced remote sensing.

Primary U.S. Work Locations and Key Partners





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Organizations Performing Work	Role	Type	Location
NextGen Imaging Technologies, Inc	Lead Organization	Industry	Windham, New Hampshire
Ames Research Center(ARC)	Supporting Organization	NASA Center	Moffett Field, California

Primary U.S. Work Locations	
California	New Hampshire

Project Transitions

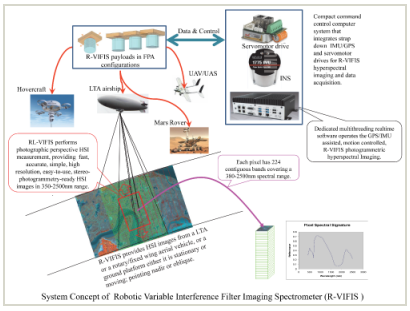
June 2016: Project Start

December 2016: Closed out

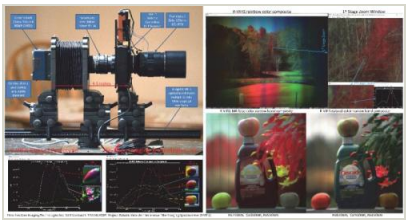
Closeout Documentation:

- Final Summary Chart*(https://techport.nasa.gov/file/139594)*

Images



Briefing Chart Image
Robotic Variable Interference Filter Imaging Spectrometer (R-VIFIS), Phase I
(https://techport.nasa.gov/image/131769)



Final Summary Chart Image
Robotic Variable Interference Filter Imaging Spectrometer (R-VIFIS), Phase I Project Image
(https://techport.nasa.gov/image/132427)

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

NextGen Imaging Technologies, Inc

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

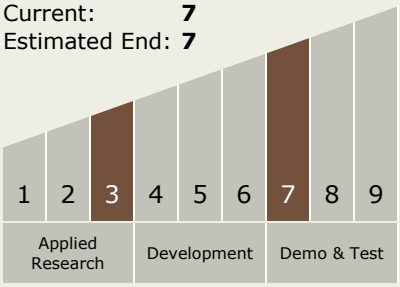
Carlos Torrez

Principal Investigator:

Xiuhong Sun

Technology Maturity (TRL)

Start: **3**
Current: **7**
Estimated End: **7**



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Technology Areas

Primary:

- TX08 Sensors and Instruments
  - TX08.3 In-Situ Instruments and Sensors
    - TX08.3.1 Field and Particle Detectors

Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System